

Anaerobic Digestion on Swine Operations in Selected States

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United States Potential

- Candidate Swine Farms 5,596
- Energy Production Potential 804 MW
- Electricity Generation Potential 6.3M MWH/yr

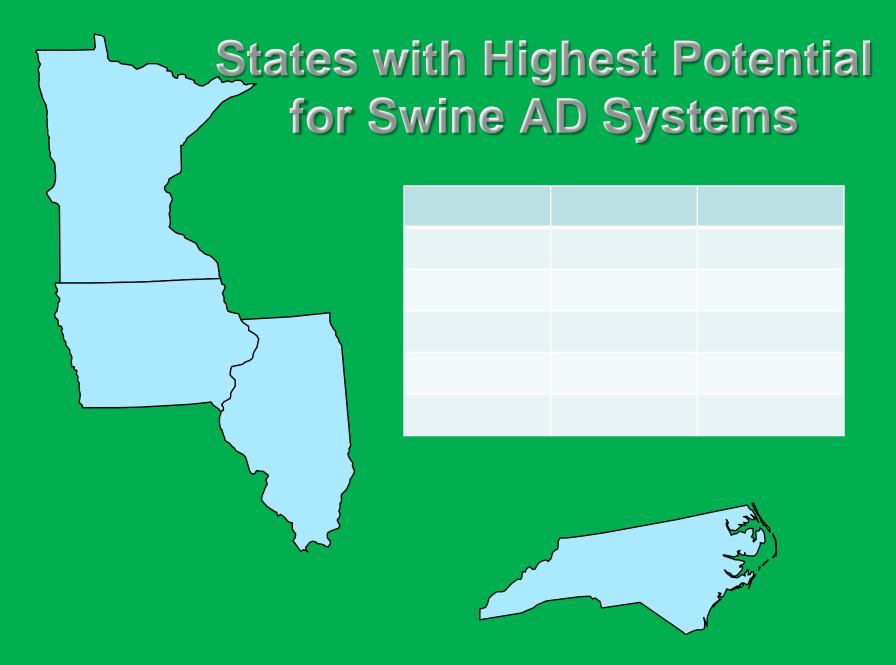
^{*} Potential estimates per AgSTAR 2010 "Market Opportunities for Biogas Recovery Systems" Fact Sheet

Swine and Mixed Feedstock Digesters

Farms with digesters: Swine = 23, Mixed = 5



Source: http://www.epa.gov/agstar/projects/index.html, Updated September 27, 2012.



^{*} Potential systems per AgSTAR 2010 "Market Opportunities for Biogas Recovery Systems" Fact Sheet

AD Environmental Benefits

- Reduced direct and indirect GHG emissions
- Improved local air quality
- Better utilization of nutrients
 - More used for plant growth
 - Less moving into surface and groundwaters
 - Less need for commercial fertilizer
- Reduced herbicide and pesticide use
- Fewer pathogens released into the environment

AD Other Benefits Improved safety less risk of explosion and fire Improved animal health? Use biogas for facility cooling? Photo courtesy of David Schmidt, University of Minnesota



Industry Challenges

- Profitability Input and product prices
 - 60-75% of costs are in feed compete with human food and ethanol
 - Narrow profit margins/contract with integrators
- Regulatory Compliance
 - Emissions
 - Nutrient management
 - Facility type and size restrictions



Pork Industry Expansion

- Exports (27% of production in 2012) predicted to grow Smithfield bought by Shuanghui 5/13
- Domestic growers see expansion opportunities
- Limited land availability
- Environmental and social pressures on local farms can be intense



Barrier Categories

Economic

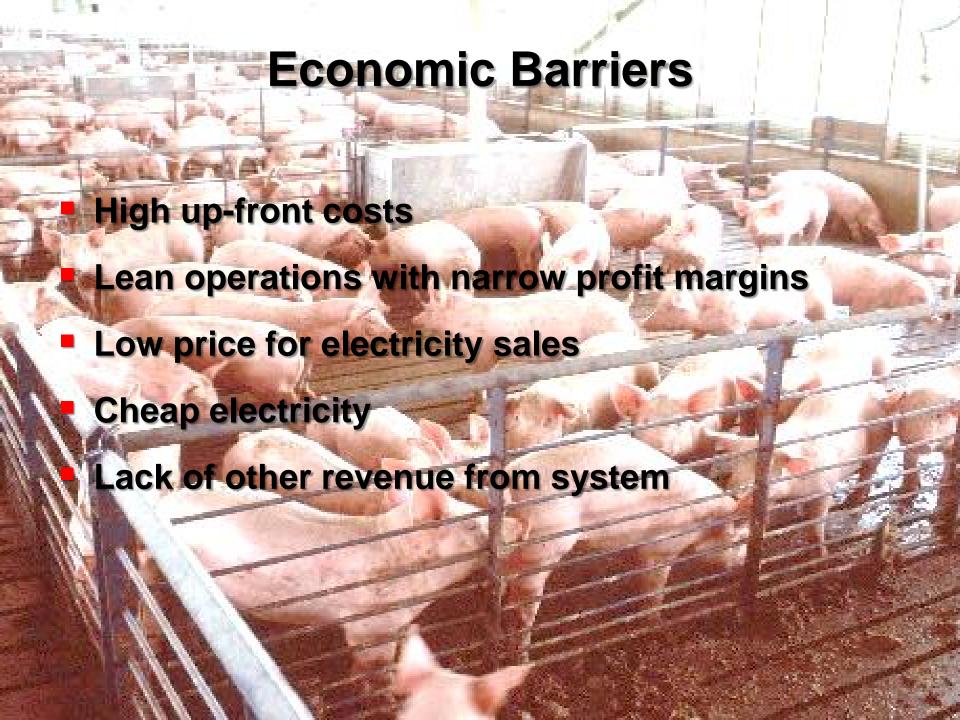
Knowledge

Barriers to AD Use on Swine Farms

Practice

Technology





Practice and Knowledge Barriers

- Structures minimize cost for collection and storage
 - Deep pit barns act as collection and storage
 - Pumped out 1-2 times per year for application
- Farms not designed to include digesters
- Poor general knowledge of AD
- Few working systems to visit





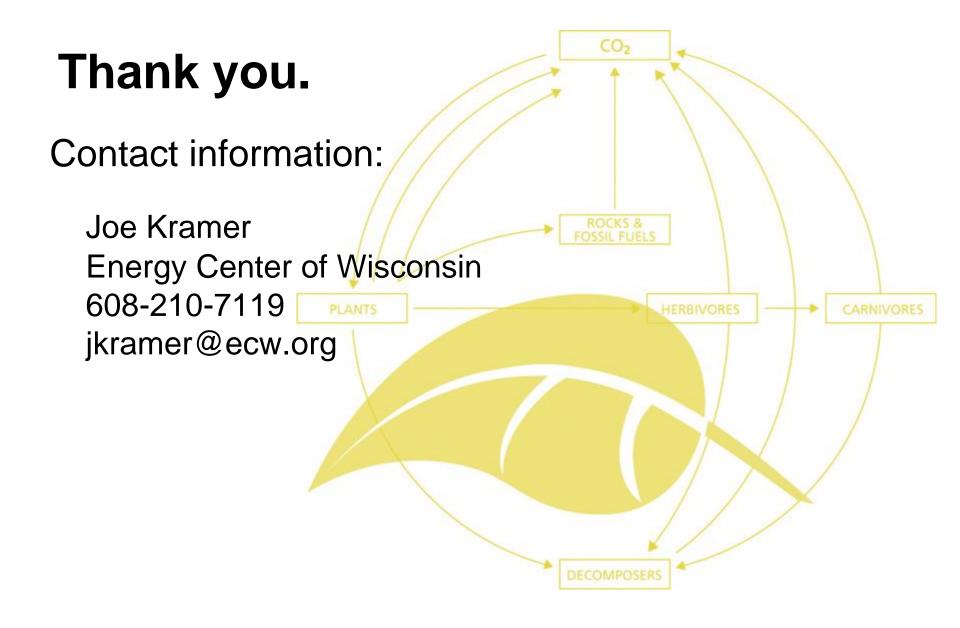
- Find ways to increase price paid for biogas electricity
 - Positive return on investment
 - Enable 3rd party build/own/operate model
 - Farm designs will be modified to accommodate
 AD
 - Manure collection will be modified

Changes (cont.) and Next Steps

- Improve general knowledge of swine AD, successes and benefits
- Improve economics through net metering, grants, and lower-cost systems

Next Steps

- Explore options for increasing bio-energy tariffs
- Promote success stories and awareness





Regulatory and Policy Issues

- Regulatory requirements: water (CAFO/NPDES, nutrient management) and air (odor mitigation, stationary engines) permitting
- Limits on open air storage
- Policy incentives are very limited in study states
 - North Carolina: largest number of direct incentives on the books, but implementation has been a challenge

Emerging Policy Opportunities

- Regulations encouraging co-digestion
- Improved implementation of NC direct incentives
- Carbon credits for the CA market
- Recognizing and valuing non-energy benefits
 - Improved manure and nutrient management flexibility
 - Odor mitigation
 - Improved control of nutrients and avoided purchases of commercial fertilizer